

4-H Bread Primer



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“He that will have a cake out of the wheat
must needs tarry the grinding.”

“Have I not tarried?”

“Ay, the grinding; but you must tarry the
bolting.”

“Have I not tarried?”

“Ay, the bolting; but you must tarry the
leavening.”

“Still have I tarried.”

“Ay, to the leavening; but here’s yet in
the word ‘hereafter’ the kneading, the
making of the cake, the heating of the
oven and the baking, nay, you must stay
the cooling, too, or you may chance to
burn your lips.”

“Troilus and Cressida.”



4-H Bread Primer

By FLORENCE PACKMAN

Revised by LULU TREGONING

VALUE OF AN APPRECIATION FOR THE ART OF BREAD MAKING

Someone has said that "Cookery is not an art but a master art." If this is true of cookery, how equally true it is of one of the arts in the realm of cookery—that of bread making. For who but the master artist can achieve that sum total of culinary skill—a perfectly shaped, perfectly baked and perfectly flavored loaf of yeast bread? Nowhere in the field of cookery is there to be found a finer art than that of bread making and bread baking. How infinitely more every 4-H club girl will enjoy her bread club work if she views bread making as an art! If a club girl sees a beautifully browned loaf as just so much flour and water and yeast, then she is indeed missing the thing that means the appreciation of bread making as an art. It is with bread making as with music—the club girl never appreciates the masterpieces of music unless she recognizes, understands and enjoys them just as she does her personal friends. On the other hand, if a club girl has this appreciation for bread making as a master art, this same loaf will hold real romance for her because it represents the evolution of an art as old as the centuries.

HIGH LIGHTS IN THE HISTORY OF BREAD

"Acorns were good till bread was found."—BACON

Bread making as we know and practice it today is not a new process in cookery—it is rather a contribution of all the ages. The yeast loaf has been developed through the course of centuries to its present highly perfected state.

Back in Hebrew history, Genesis 18, fifth verse, we find the first biblical reference to cooked food—the "Morsel of bread." Here Abraham instructed Sarah to "make ready three measures of fine meal." And this she kneaded and "made cakes upon the hearth." This was the Jewish unleavened bread of which we hear so much throughout ancient history. Unleavened means unlightened—bread not raised by means of some leavening agent such as the gas produced by the growth of the yeast plant. Unleavened bread is flat and hard and altogether different from the light, palatable bread that we know today as the "staff of life," and yet it was the forerunner—the first cousin, as it were—ages and ages ago of our modern yeast product.

It would be difficult to conceive of any food more universally used than bread. From the dawn of history, as has been mentioned in the preceding illustration of Sarah, bread has constituted one of the staples of diet. As early as 1624, Winslow, an English writer, referred to it as the "staff of life," and it has been so designated until the present day. Highly fascinating is the story of the history of bread. As history can be studied through the lives of great men and women so, too, is it revealed through the bread eaten by people of different eras and ages. In fact a nation's civilization can be estimated by the bread its people eat. For example we do not find among any savage or semi-barbarous tribes a leavened bread such as the highly civilized people of the world use. The yeast loaf of today did not develop overnight. It took thousands

of years to produce it. It is the result of the contributions of the master bakers of all times.

It is also of interest to note that the mental status of a nation is almost invariably indicated by its bread. For example the Eskimo consumes a primitive concoction which is a form of bread and the Italian likes to serve his bread in fantastic forms.



Let us go back into the long, long ago and look at some of the interesting historical points in connection with bread. The oldest known form of bread is the biscuit. Fragments of biscuit have been discovered in the Swiss lake dwellings which belong to the Neolithic age.

Bread baking is said to have originated in Egypt, from thence it spread into Greece and from there to Rome in 583 B. C. The people who really developed the art of baking were the monks of the Middle Ages. The very earliest English bakers were undoubtedly monks. And it is to the monks of Europe that we are indebted for the preservation and development of the art of baking. Very probably the

bread of central Europe would not be the superior product they are today were it not for the work of the monks during the Middle Ages. Every monastery had its bakehouse and the consecrated bread was baked with imposing ceremony.

Bread has always been surrounded with many superstitions. It has always figured as altar sacrifices to the gods or perhaps as the principal food of sacred feasts. At one time during the tenth century it was a custom in court to let the prisoner taste a piece of unleavened bread over which mass had been said and if he could not swallow it he was declared guilty.

White bread was first used in the church and represented "The Body of Christ." The clergy allowed some of the unconsecrated bread to be sold to the nobility, then as wealth developed the middle classes were able to purchase it. Later the baking of white bread was removed from the convents where it was baked by nuns and monks to the homes of the rich where bake ovens were installed.

In the museums throughout the world are preserved not only the ancient stoves used in the baking of bread but the bread itself. The Royal Museum in Berlin contains loaves of coarse barley bread taken from Egyptian tombs of 2500 B. C. The Metropolitan Museum expedition of 1919-20 in the unearthing of the great tomb of Prince Mehenkinetre of Thebes (2000 B. C.) found a miniature bake shop containing the carved figures of bakers and their assistants, also the prototypes of ovens and mortars for grinding grain. The following description gives one a mental picture of this old bread-baking establishment.

"Inside the doors sits the overseer, baton in hand. Men bruise the grain with a pestle after which it is ground to flour by women. The dough is made or rather mixed by men in tall tubs and shaped into loaves and cakes by others. The four black ovens are all tended by a man with a poker."

The bread of bible times is generally thought of as unleavened, yet we have considerable proof to show that leaven was used to lighten the bread of great antiquity. While the Chinese are credited some-

times with having baked the first leavened bread, nothing definite has been discovered as to the methods they used. We do know, however, that along with many other arts, that of baking was transmitted from the Valley of the Nile into Greece. In one Greek classic alone 62 varieties of bread are mentioned.



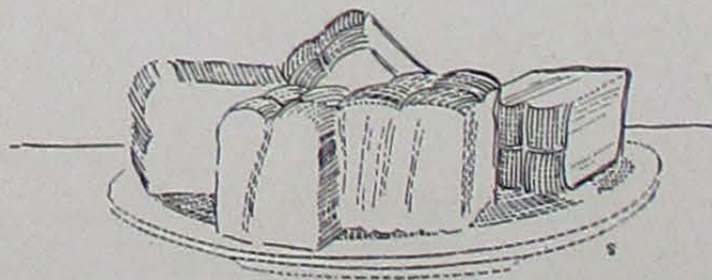
Ancient Rome supported over 300 bake houses, the majority of which were conducted by Greeks. In those ancient days the Greeks had a reputation for making the best bread, even as they have today in America for making delectable confections.

Startling discoveries as to the crude efficiency of these old bake shops have been made through recent excavations in Pompeii. A loaf of bread was found with the baker's name stamped upon it, "Eleris J. Crani Rese," showing that even the Romans of old knew that it "pays to advertise."

The Greeks and Romans prepared a bread with leaven which could be kept any length of time. They made a batter of bran and fermenting cider and dried it in the sun. An extract of Pliny reads, "When the Gallic brewers steeped their wheat in water and mashed it for their drink, they took the froth that collected on top and used it instead of leaven, which was the reason that their bread was always lighter than any other."

It was from the Romans that the Germanic tribes of central Europe received their knowledge of baking bread in ovens. They had baked flat unleavened bread—cakes in red hot embers. In Germany the monasteries enjoyed quite a reputation for their skill in baking. During the reign of Charles the Great the Zwiebach baked in some of these cloisters was famous. In fact we owe a great deal to those old monks of the Middle Ages for the preservation and development to a large extent of the art of baking.

The earliest bread used in England was a sort of porridge made of flour or meal mixed with water and boiled. When kneading flour into the dough became common, the bread was more closely akin to a tough, unleavened cake. The baking of these cakes was one of the most important occupations of women. The most dignified of matrons considered it a great distinction to bake bread and the modern title of "lady" originated in her being the "loef-dieu" or server of bread. In this primitive stage in the art of baking, ovens were still unknown in England and the cakes were toasted either upon the hearth or upon a gridiron. An anecdote that has come down through history from Anglo-Saxon days tells how Alfred the Great allowed the neat herd's loaves to burn on the hearth-stone.



Probably no baking industry dates farther back than does that of the Jews. Investigation shows that varieties of bread eaten thousands of years ago are still in

daily use among the Jews. As with most foods the Jews looked upon their bread with religious conscientiousness.

Thus a brief survey of the history of bread shows us that it has been made since the dawn of history. Bread itself is not new, but the methods employed in making it have changed and are still changing.

THE A-B-C'S AND X-Y-Z'S OF BREAD MAKING

INGREDIENTS

Good ingredients do not always mean good bread, but neither can we expect good bread without good ingredients. In other words, indifferent materials even though skillfully put together will not produce a perfect loaf. A raised loaf of bread might be made with three ingredients only—flour, liquid and yeast; but it would be so unpalatable that it might better not have been made. But if we add to these three ingredients, salt, sugar and shortening we shall get a loaf that is not only light but also one that has a delicious flavor. Therefore we think of six ingredients as being essential to the making of good bread. For a standard 2-pound loaf the amounts of these six ingredients are as follows:

- 5 c. sifted flour
- 1 cake compressed yeast
- 1½ tsp. salt
- 2 tsp. sugar
- 1½ c. water
- 1½ tsp. fat.

Flour

Throughout the ages every kind of cereal has been ground into flour and made into bread. The early Greeks used wheat principally but also barley, rye, millet, panic, spelt, rice, tiphe, lotus roots, corn flag roots and a grain from Ethiopia called ouidion. We have seen in the foregoing discussion of foreign breads how many different cereals are used in the making of bread. But we know from our experiences during the war that wheat makes by far the best bread flour. We can well remember our struggles during the conservation-of-wheat days in trying to produce a yeast bread from barley, cornmeal or oats. And how this bread crumbled—and how the dough refused to rise and make the loaf that the wheat flour does. The reason for these difficulties was that none of the other grains contain the quality of gluten that wheat does, and gluten is the particular protein in the wheat kernel which forms the framework of the loaf. The gluten in the flour develops during the bread making process and because it has elastic properties it allows the dough to rise and hold the carbon dioxide gas within the walls. (Compare a cornmeal dough, containing an inferior quality of gluten with wheat dough in this respect). Then during the baking the gluten hardens and thus forms the walls or frame work of the loaf.

Obviously, then, wheat that yields the largest amount of this valuable protein called gluten will make the best bread flour.



Classes of Wheat. There are two main classes of wheat known as soft winter and spring wheat and hard winter and spring wheat. The hard wheat makes the most satisfactory bread flour because it contains more gluten and a harder gluten than the soft wheat. The spring hard wheat will contain even more gluten than the winter hard wheat because it receives more sunshine during the growing period. Most of the hard wheat comes from the northern and western states while Iowa, Kansas, Nebraska and southern states grow soft wheat.

Kinds of Flour According to Wheat. (Reference, Breadmaking by Bennion.)

1. Hard wheat flour.
 - a. Contains more sugar than soft wheat.
 - b. Weighs more—1 quart sifted once weighs 16-17 ounces more than soft.
2. Soft wheat (better for quick baking)
 - a. Great quantity of soft wheat causes loaves to lose stability and will not produce bold looking loaves.
 - b. French people use soft wheat entirely and perhaps this is reason loaf is not deep.

New Flour on Market. Many times the housewife has such sticky bread when using the new flour on the market. This is usually due to the fact that the flour has not been aged enough. Aging removes some of the moisture and hardens the gluten. Sifting the flour five times will equal 2 weeks' aging.

Grades of Flour. Flours are branded short patent, high patent and best patent. The first milling operation removes the covering of the wheat berry. The wheat is dampened so the outside covering is loosened and comes off easily when wheat passes through the first rolls of corrugated steel. The wheat is then run through several sets of rollers until it is fine enough for flour but still contains a quantity of dark material which is found next to the bran. By a sifting process this dark material is separated from the flour and *straight* flour, or what is termed by millers as 100 percent flour, results.

Straight Flour. The straight flour is suitable for bread and other baking, but does not suit the average housewife as it is not quite light enough.

Patent Flour. By a patented process the lightest and fluffiest of the straight flour is separated from the heaviest or more undesirable flour and is called patent flour. Bennion in his book, "Breadmaking," says, "Bakers like this flour as it is a better bread yielder." If one-third of the straight flour or 33 percent is taken out by patent process, there is 67 percent of very fancy flour which can be sold as a fancy patent and branded fancy, high or best patent as mill may choose.

Often a higher priced flour is really a short patent which costs more and is really worth more for it makes a larger quantity of bread. The better flour may be compared with an inferior grade by keeping account of the number of pounds of bread produced from the same amount of flour. Also, compare the quality of the bread as well as the energy consumed in making it.

Blending of Flours. Various wheat flours are mixed together to be used for general purposes in baking. Sometimes these are called "general purpose flours" or the label on the flour bag says, "May be used for bread, cake, pies, etc." If one buys flour in very small quantities, she is apt to get general purpose flour. If it is used for making bread by the average method, one gets into difficulties as the blends usually consist of a mixture of soft and hard wheats.

The blended flour may be used successfully for all other baking, but when using for yeast breads the method of making and baking must be changed as discussed on page 7.

The blended flour costs less so it is a saving to use the blended for general purposes while the hard wheat flour may be used for yeast breads.

Most of our milling companies that have been in the business for years make practically a standard flour year in and year out so the flour does not vary much in content nor in handling when made into dough.

Storage of Flour. Flour should be stored in a tight covered metal container in a cool, dry place. Flour is best if shipped in heavy paper bags so moisture, dirt, nor odors do not affect it.

Sometimes bacteria get into the flour and ropy bread results when it is used in making bread. There will be long, stringy threads like sugar threads 24 hours after the bread comes out of the oven. It develops an odor and the crumb may develop brown spots. The flour has become contaminated and the wheat may have been contaminated in the first place so if the club girl has properly stored the flour, the only solution is to return the flour to the grocer.

Tests for Flour. Here are a few tests which every club girl may apply in determining the kind of flour she is using before she begins her baking so she may adapt method to kind of flour.

1. Good flour should be creamy in color. (The gluten gives this tinge.)

2. When rubbed between the fingers it should feel gritty or grainy. Cake flour feels more like velvet. Blended flour will have different textures. If it has more hard wheat it tends toward gritty; if more soft wheat than hard, it feels rather soft.

3. It should smell like freshly cracked nuts.

4. When pressed in the hand it falls loosely apart. If it remains in lumps it has too much moisture in it.

5. Flour should contain a liberal amount of gluten. This test is best for telling whether flour is soft or hard or a mixture of soft and hard as in the blended flour.

Gluten Test. Mix one cup of bread flour with enough water to make a stiff dough. Place in medium cheesecloth and let stand 1 hour in a bowl of cold water. Then wash in several waters until the water is clear. (The substance coming from the flour that keeps clouding the water is the starch.) The final material left in the cheesecloth is the gluten. When you pull it apart it will rebound like rubber. It is this elasticity that makes it so valuable in the rising of bread. If you shape the gluten into a ball and bake it in a moderate oven for about 15 minutes it will expand until many times its original size. Thus you will see how gluten really forms the framework of the loaf of bread.

If the flour is a hard wheat flour, the gluten is easier to gather in the cheesecloth or with the fingers while if it is a soft wheat flour, the gluten will not hold together so well and has a tendency to run through the cheesecloth. There will also be a larger amount of gluten from the hard wheat flour. The size of the gluten ball when baked may vary from 2½ inches in depth for hard wheat flour to ½ inch for cake flour (soft wheat). The amount of gluten from the blended flour will come in between these.

Methods to be used according to the kind of flour:

1. Hard wheat flour.

Use method under recipe for whole wheat bread, p. 20.

2. Soft wheat flour (same method of mixing but use following

directions as this flour has less gluten and a softer gluten so will not hold carbon dioxide gas so long.)

- a. Use 2 cakes of yeast to about 7 cups flour as this shortens the period that gluten holds gas. It will also take more flour than the recipe calls for.
- b. Will not stand hard beating or kneading.
- c. Loses much moisture during first rising, so make as soft as conducive to handling.
- d. Let dough rise once or twice according to softness of flour.
- e. Use moderate oven for baking—350°-375° F.

Food Value: (1) *White Bread Flour.* Ordinarily white bread flour or what is known as highly refined flour contains the following food principles:

Carbohydrates	76.6 percent
Water	11.5 percent
Protein	11.4 percent
Fat	1.0 percent
Minerals	0.5 percent

In this kind of highly refined flour all of the bran coats of the wheat kernel are carefully removed, and it is in and underneath the bran coats or the outer covering of the wheat kernel and the germ that the minerals and vitamins lie.

(2) *Whole Wheat Flour.* Thus the entire wheat and whole cereal flours are more healthful in that they furnish more minerals and more vitamins in addition to being valuable also because of their roughage or bulk. The following table shows the comparative amounts of iron, calcium and phosphorus in patent flour and entire wheat flour:

	Calcium	Phosphorus	Iron
Pat. flour	.025%	.2 %	.0015%
Entire wheat flour	.061%	.902%	.0053% —Vitamin B

This shows that in the milling process about three-fourths of the iron, three-fourths of the phosphorus and about half of the calcium are removed. While we cannot get all our vitamins and minerals from whole cereal breads, they are one excellent source of these life-giving substances.

We are learning these days how important iodine is in the prevention of goiter. Experiments have revealed that iodine is more concentrated in the coarse part of the grain, with only small quantities in the white flour. One sample of wheat found in an experimental flour mill contained 6.6 mg. of iodine per ton so you see that only a small amount is contained at best. However, that 6.6 mg. was distributed thus:

Straight flour	2.37 mg.
Bran	3.28 mg.
Shorts	.9 mg.
Red Dog	.04 mg.

These figures are not intended to show that eating white breads exclusively will give one goiter. They are put in rather to show one additional standpoint from which whole cereals are healthful.

In some sections of Iowa where wheat is raised, the farm women have their own small home mills and grind their own whole wheat flour. This is the "pure" flour, containing all of the minerals and vitamins that

Nature gave to the wheat kernel. This home ground flour makes delicious bread.

There is a difference in the home milled flours depending on the kind of wheat. Some wheats produce a stickier bread, making it more difficult to handle.

Whole wheat should be ground fine so it does not contain harsh rough material. Not more than one or two tablespoons of fine bran should remain from sifting 1 quart of whole wheat flour. This bran is again added to the sifted whole wheat for it contains iron.

Many people say whole wheat flour will not keep during the summer. A well known brand which is properly milled has been kept a year in a tight covered tin container without becoming rancid or infested with insects.

(3) *Graham Flour*. The terms applied to the various wheat flours have been confused. Graham flour derived its name from a Doctor Graham, who first advocated the healthfulness of this coarse flour. Graham flour consists of the entire kernel but is not ground so fine as the whole wheat flour. Often one finds these interchanged by the millers and grocers.

However, when sifting the graham flour the quart sifter is about one-third to one-half full of coarse bran coats while the material that went through the sifter should be brown in color. This color proves that the entire wheat kernel has been used. Sometimes graham flour is only an inferior flour mixed with coarse bran, in which sifting shows that the material passing through the sifter is almost like white flour. Thus most of the minerals and vitamins have been removed.

Whole wheat and graham flours then contain same food value but whole wheat is finer and contains a roughage much easier to digest.

Liquid

The various liquids which may be used with equal satisfaction in making bread are: Milk, water, potato water, whey water and mixtures of these. When milk is used the food value of the bread is materially increased, as are also the keeping qualities. The grain is even and moist. In order to prevent the development of any objectionable bacteria, however, the milk should always be scalded and cooled before using. Of course if the milk has been pasteurized, this is unnecessary. The professional baker generally prefers milk powders because they give him a standardized liquid. If milk is substituted for water in a recipe the amount of flour should be decreased because of the larger amount of solids present in milk. Water, however, is the most universally used liquid in bread making. Potato water hastens the action of the yeast and produces a more tender bread due to minerals. Water makes the bread coarser at intervals in the loaf.

Yeast

Have you ever wondered when the first yeast was used in the world? No doubt its discovery came about quite by accident for there has come down to us through history the incident of how an Egyptian slave, long years before Christ, left a ball of moist dough out in the open for a period of several days. The hot rays of the African sun baked this dough and there resulted a leavened bread. Of course the ancients did not realize that it was the "wild yeast" or the yeast plants in the air which had been caught in this dough and had thrived on the food and moisture and warmth thus producing, as they grew, carbon dioxide gas which leavened the dough.

Today we know that yeast is a tiny plant, subject to the laws of plant life. Any plant in order to grow must have food, warmth, air and moisture. This is true of yeast no less than of any other plant. The yeast gets its food from the flour and sugar, its warmth from what is supplied in the warm liquid and temperature of the room, and its moisture from the liquid. Deny the yeast plant any of these or give them in exaggerated amounts and you will interfere with its growth.

Yeast is the *soul* of the dough. If you kill this tender little plant, you might as well throw out your bread for it can never be good. Yeast plants grow best at about 80 to 82° F. Colder temperature retards their growth but extreme heat kills them. Water over 108° F. should never be used.

Within the yeast cells there is a tremendous latent power. One pound of yeast can raise 150 times its weight of dough. Yeast can transform a small flat mass of dough into a balloon-like shape five times its original size in 3 hours.

As has been indicated the yeast in growing causes fermentation and thus a gas known as carbon dioxide is formed. It is this gas which in trying to escape from the dough raises or leavens the loaf.

There is a leavened bread known as salt-rising bread made without the addition of any yeast. Here there is a natural ferment, produced no doubt by a "wild yeast" in the flour. There is a terrific odor from this ferment, but the bread is delicious.

Yeast is obtainable commercially in two forms, compressed and dry. Both forms have advantages and disadvantages as will be seen in the following discussion—but both accomplish the same results.

Compressed Yeast

Compressed yeast is collected from the surface of distillers' vats. After it has begun to grow vigorously it is massed together and then pressed into small cakes. It is then encased in the tinfoil wrapper you are familiar with—the tinfoil excludes the air and thus helps to prevent its growth which would also mean spoilage. Another precaution to observe in regard to compressed yeast is to keep it at a low temperature about 45° F. If the temperature is above this the cells begin to grow and if there is no food for them their strength is greatly diminished and the yeast cannot be used.

If you are using compressed yeast check it up on the following points:

1. Should break crisply with a clear break.
2. Should have a clean yeasty smell.
3. Should have an even, sandy color with no dark discolorations.
4. Should be brittle—not soft and putty-like.

Bread can be made in a much shorter time when compressed yeast is used than when dry yeast is used, because the yeast plants are in an active state. This fact also means that compressed yeast is not easy to keep—it spoils easily—and for this reason can be bought only where the demand is large enough to warrant fresh shipments almost daily. Because compressed yeast makes it possible to bake bread in a short time, it is generally used in a club demonstration where 25 minutes is the maximum amount of time allowed to any demonstration team. Many farm women of Iowa use compressed yeast. A two weeks' supply may be kept on hand if stored at low temperature.

Dry Yeast

Dry yeast, like compressed yeast, is collected from the distillers' vats, but differs from it in that it is mixed with cornmeal and dried. When thus dried the yeast cells are not in an active state and, therefore, must be soaked in water or started in a sponge before they act. Thus the use of dry yeast means a longer process. The advantage of dry yeast is that it may be kept on hand for a long period.

It used to be supposed that the "yeasty" taste which bread sometimes develops was due to the presence of too much yeast. We know now that such is not the case. This undesirable flavor results from too long a fermentation or fermentation at too high a temperature. In general we need not be afraid of using too much yeast. A good palatable loaf has been secured in experiments where one-half pound of yeast was used to one quart of water. Of course we would not ordinarily use this large amount of yeast as the cost would be beyond reason. However, it is a clearly demonstrated fact that a shorter fermentation period develops a better flavor in bread than does a longer period of fermentation.

Tests for Fresh Dry Yeast. (1) A small alphabetical letter is used on the wrapper and a change in this letter in 3 to 6 weeks denotes fresh yeast. (2) Take one cake of dry yeast, 1 teaspoon of sugar and add 1 cup of lukewarm water. Let stand 1 hour and bubbles of gas will rise to the surface within an hour if the yeast is fresh. This material may be used in the sponge.

Amount of Yeast. The amount of yeast depends on the amount of time a club girl wants to use in making bread, on the amount of money she has and the kind of flour being used. Yeast adds a little to the cost but an increased amount shortens the time of making the bread.

One yeast cake will make 6 two-pound loaves but 2 yeast cakes will decrease the amount of time by half and the flavor of the bread is better. All yeast should be stored in a covered, dry container.

Sugar

As we have noted, yeast like any other plant requires food in order to grow. The carbohydrates in the flour furnish a part of this food. The yeast first uses as food the natural sugar present in the flour and then attacks the starch, breaking it down into sugars which it can feed upon. This is not desirable, however, as the yeast plants thus use up their energy in breaking down the starch into sugar and so lengthen the period of fermentation. It is therefore better to add sugar to the bread mixture to furnish the yeast an accessible food. Liquid honey also is used as an ingredient in place of sugar.

The volume of a loaf of bread made without any sugar will be slightly smaller than one made with sugar because the yeast plants have had to use part of their energy in preparing their own food and have not been able to raise the loaf to its normal size. Too much sugar, however, is not any better for yeast than it is for you because it will result in too moist a loaf that does not rise properly. A good proportion of sugar is $1\frac{1}{2}$ teaspoons for each 2 pounds of bread.

At least three good reasons exist for adding sugar to a bread mixture:

1. To improve the flavor.
2. To provide food for the yeast.
3. To give the bread a tender, brown crust.

Salt

"Because I like a pinch of salt in my soup is no reason I wish to be immersed in brine."—OLIVER WENDELL HOLMES

If you have ever forgotten to add the salt to your bread mixture, you may remember how flat the taste of that particular bread was. Salt is a very necessary ingredient in bread in developing the flavor. It is capable of bringing out the taste of other ingredients such as sugar, shortening and milk. Furthermore, salt is a distinct aid in regulating the fermentation. Salt has a binding influence on the gluten and thus acts as a regulator or governor of the fermentation. It also acts as a retard on the growth of yeast—this is the reason for omitting the salt in an overnight bread sponge. Too much salt inhibits the growth of yeast—too little permits the yeast to grow too rapidly. A good proportion for general use is $1\frac{1}{2}$ teaspoons of salt to a 2-pound loaf.

Paul Richards in an article, "Value of Good Salt in Bread," in the "Baker's Helper," tells us of one baker who had trouble with hard crust on his bread. The baker found that it was caused by a poor grade of salt. He changed to a better grade of salt and found that by using exactly the same formula otherwise, the bread then had a thin, soft crust.

Shortening

Shortening is an essential in bread making because it helps in accomplishing the following results:

1. Gives bread a flaky crumb.
2. Produces a tender crust.
3. Makes loaf more moist and thus increases the keeping qualities.
4. Increases palatability.

A great variety of shortenings are used in bread—lard, butter, and the vegetable oils such as corn, cottonseed and peanut and the butter substitutes such as margarine. Lard and butter are, no doubt, most commonly used.

The fat should not be added until the dough is partially mixed. This will prevent the particles of flour from becoming coated with fat before they have absorbed equal quantities of liquid. If the fat is melted and added in the liquid the flour particles may become coated with fat and thus cause dark streaks in the loaf.

Too much shortening will tend to make the bread heavy. A standard amount is 1 tablespoon of shortening to a 2-pound loaf.

FACTORS IN BREAD MAKING

The two most important factors in bread making are *temperature* and *fermentation*. We have seen in our discussion on yeast how vital to the making of good bread is an intelligent understanding of temperature. More and more we have come to realize that the thermometer is the means of removing the uncertainty from the whole question of temperature. We know that the ideal temperature for yeast growth is 80 to 82 degrees F. This temperature should be maintained throughout the fermentation process. A thermometer inserted into the dough will enable you to tell whether your bread dough is too cold or too warm or "just right." An ordinary dairy thermometer may be used in bread making.

In order to have an even temperature we find that it is best to have the room temperature about 80 to 82 degrees just as is the dough. How-

ever, this is not always possible. Sometimes the room is colder and sometimes it is very much warmer. Therefore we must vary the temperature of the liquid and flour used in making the dough so that the combined temperatures of the room, flour and liquid should be 240 degrees F. as:

Room—80 degrees.

Flour—80 degrees.

Liquid—80 degrees.

Let us assume, however, that it is a very hot summer day and our room temperature is not 80° but 90°—then in order to keep the combined temperature 240°, we must decrease the flour and liquid temperature to both 75°. This will then make:

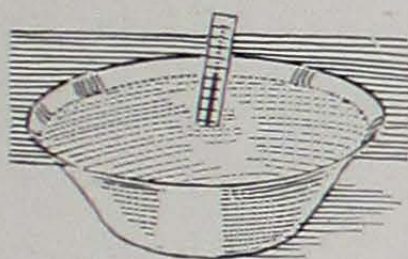
Room—90 degrees.

Flour—75 degrees.

Liquid—75 degrees.

Total 240 degrees.

The liquid, however, should never be used if it is above 108 degrees F. because it will be too hot for the yeast. O. W. Hall of the American



Institute of Baking says, "Probably the most common fault in the matter of temperature is mixing doughs too warm. There is a certain coarse grain and dark color, a certain waxiness and odor, which nearly always results from a warm dough."

Fermentation. Fermentation is the second great factor in bread making. By fermentation we mean the "rising" or the period during which the dough reaches maturity. The baker calls this same process "proofing." During the fermentation process the temperature must be kept at 80° to 82° in order that the yeast may grow and thus the fermenting takes place. If the fermentation process is not continued long enough, the bread will be heavy. If, on the other hand, fermentation goes on too long, the bread will be too light and will have large cells throughout.

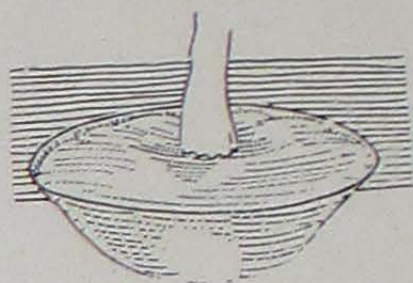
Fermentation begins when the dough is mixed and continues until the baking. During the fermentation process carbon dioxide gas is formed due to the growth of the yeast and its action on the flour and sugar. As these bubbles of gas are given off they are held in the dough by the gluten which forms a covering around them. These bubbles mixed throughout the dough expand the dough and make it rise. It is this rising process which makes the leavened breads so superior in quality to the flat, unleavened ones.

The first fermentation or rising generally takes about 2 hours, though this is variable. This period is finished and the dough ready for the second kneading when it has doubled its bulk. The dough at this stage sometimes has blisters or gas bubbles on top. These bubbles are a certain sign of good bread to many expert bread makers. Also the finger pressed into the dough will leave an impression at the end of the first fermentation.

The second and third fermentation periods follow the second and third kneadings and are of about 45 minutes and 15 minutes' duration, respectively. The third rising brings the dough to maturity, which means that the dough is then ready to be made into loaves.

THE WHY AND HOW OF KNEADING

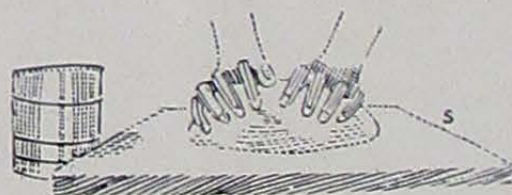
The purpose of the first kneading is to mix thoroughly the ingredients and distribute the yeast throughout the dough. If the dough seems sticky when turned out on the board, it is better to let it "rest" about 5 minutes than add more flour. Dough should always be allowed to "rest" after being handled. During this period the gluten tightens up and it is then unnecessary to add more flour. If more flour is added, it should not be warmed in the oven because the gluten, like gum, becomes soft and the dough will become sticky. Too much flour will then have to be added and the bread will be dry and crumbly. If more must be added, add it sparingly. A soft dough makes better bread than a too stiff one.



Dough should be kneaded lightly and quickly. Press on the dough with the palms of the hands, curving the fingers over the dough and do not permit it to flatten out. Fold the dough with the fingers and push. With every push turn the dough one-fourth of the way around, counting four and pushing on each count. Real rhythm may be incorporated into the kneading process. The kneading should be continued only long enough to develop a smooth and elastic dough. The bread mixer is good labor-saving equipment to have in a home where large amounts of bread are baked.

We used to think that bread must be kneaded until our backs gave out, but we know now that the texture, whiteness and flavor of bread depends not on the length of time of kneading so much as on the number of kneadings. In handling dough always handle it lightly and gently.

When dough is ready for the second and third kneading it will be double its original bulk. Rather than remove it from the bowl, punch the dough down in the center. (You will hear the sound of escaping carbon dioxide gas as you do this and this escape of the gas reduces the dough to its former size.) Then fold over the dough from each of the four sides, punching down lightly with each fold.



This is all the kneading required at these two times—just enough "punching" to distribute the gas throughout the dough.

BAKING AND CARE AFTER BAKING

Many a loaf of good bread dough has been ruined in the process of baking. The baking of bread is, if anything, the most vital process in the making.

If you are fortunate enough to have an oven thermometer, your problem is greatly simplified. For insulated ovens which give a uniform and even heat the temperature should be from 315° to 340° F. For portable ovens which yield an uneven heat the temperatures may be higher, from 400° to 425° F. The temperature should be the highest when the bread is first put in the oven—the loaf should rise to its greatest size in the first 15 minutes of baking and the yeast must be killed. Then the temperature should be reduced gradually to 380° F. for portable ovens and to 315° for insulated ovens. The bread then begins to brown and continues to bake on the interior.

If you have no oven thermometer you may test your oven in a number of old and quite satisfactory ways:

Flour Test. Place $\frac{1}{2}$ teaspoon white flour in a pan and spread to $\frac{1}{4}$ inch thickness. Place pan in oven and if the flour becomes golden brown in 5 minutes, the temperature is right for bread making.

Ovens are not of uniform temperature throughout and for this reason bread should be frequently turned during the baking.

Ideally every loaf should be baked in a separate pan as this insures uniform and thorough baking. When four or five loaves are crowded into one pan the end loaves are sometimes burned while the middle loaves are insufficiently baked. The loaves are also of poor shape.

The time required for baking bread varies from 45 minutes to 1 hour. Bread is sufficiently baked when it shrinks from the sides of the pan and produces a hollow sound when tapped.

In the bakeries live steam is forced through the ovens to produce a tender crust. The same result may be accomplished at home by placing a pan of hot water in the oven during the baking. Brushing the surface of the loaf with fat when setting away to rise and using a pan of hot water in the oven produces a thin tender crust.

In the oven the yeast plants are killed by the high temperature and of course the fermentation process is stopped. The best bread results when the loaf finishes rising during the first 10 minutes of baking.

When the loaves are thoroughly baked they should be removed immediately from the pans and placed either on a wire cooling rack or across the edges of the pan. This permits free circulation of air on all sides of the loaf and prevents steaming and consequent soggy crust. Do not cover the bread while cooling. When thoroughly cool, place the loaves in a clean, well ventilated container. Bread containers should be scalded and exposed to sunlight every 2 or 3 days in summer and every week in winter in order to prevent the bread from molding. Bread very readily absorbs other flavors and should always be kept by itself. Never wrap loaves in cloth as this absorbs the moisture and imparts an objectionable taste to the bread.



EXPLANATION OF GENERAL METHODS OF BREAD MAKING

The two general methods most commonly used in bread making are known as the "Straight Dough Process" and "The Sponge Method."

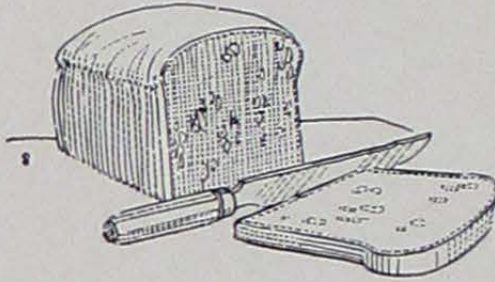
The straight dough process is the quicker of the two. Compressed yeast is used and all of the ingredients are mixed into a dough immediately and set away for the first rising.

The sponge method is the older process and requires more time. If dry yeast is used, this necessitates preparing a sponge the evening before the bread is to be made. In the morning the remaining ingredients are added to this sponge and the dough is then formed which is ready for the first

rising. The bread is now at the same stage where it is with the straight dough process about 10 minutes after beginning (depending upon the speed of the worker). Compressed yeast sponge may stand an hour before mixing into soft dough.

JUDGING A LOAF OF BREAD

The value of knowing how to judge bread is that it gives us standards of perfection. Weighing, mentally, the good and bad points of a loaf of bread enables us to develop our judgment. One who is a good judge of bread will also have a keener appreciation of bread making as an art.



There are also various score cards in use for bread throughout the country. The following one gives a clear idea of the relative values of the different points to be considered:

BREAD SCORE CARD

Shape and size	10 percent
(Loaf should be evenly rounded on top without bulges, good form)	
Crust	10 percent
(Smooth and unbroken with no humps or wrinkles. Golden brown in color, shredded appearance above the edge of pan. Cut loaf and crust should be tender and about $\frac{1}{8}$ inch in thickness all over)	
Lightness	15 percent
(Press cut loaf between hands; when released it should spring quickly back to original shape)	
Color of Crumb	10 percent
(Look across cut loaf from an angle. Should show no dark streaks or patches. There is an instrument called the tintometer which may be used to measure the color)	
Texture and Grain	25 percent
(Texture is determined by the sense of touch and refers to the elasticity and pliability of cell walls. Ideal texture is soft and velvety. Grain refers to the character of the cell structure and to the size of the cell. Ideal grain is close and fine and the cells are elongated and thin-walled. Coarse grain has large thick walled cells unevenly distributed). Cut thin slice and hold up to light to see cell structure.	
Flavor and Aroma	30 percent
(Determine flavor by taste. Determine aroma by sense of smell. Both should be the flavor of true wheat or of freshly cracked nuts)	
Total	100 percent

SOME COMMON DEFECTS IN BREAD AND REASONS FOR THEM

1. Ill-shaped loaf:
Not moulded well originally
Too large a loaf for pan

Fermentation period too long
 Did not rise to greatest size in oven
 Too low temperature in oven

2. Crust:

Cracks in crust

1. Cooling in a draft
2. Baking before sufficiently light
3. Oven too hot at first

Too thick a crust:

1. Oven too slow
2. Baked too long
3. Excess of salt
4. Did not use shortening on top
5. Did not use pan of hot water in oven or pan with too small a surface

3. Heaviness:

Unevenness of temperature while rising
 Insufficient rising
 Insufficient kneading
 Poor materials
 Not enough yeast
 Too much or too heavy kneading
 Pressure when molding loaf

4. Dark patches or streaks:

Poor materials (yeast and flour)
 Shortening added to liquid before flour, thus allowing flour particles to become coated with fat before they had absorbed equal amounts of liquid
 Surface of dough dried out during fermentation period

5. Texture and Grain:

Sogginess

1. Too much liquid or not enough flour
2. Insufficient baking

Dry and crumbly:

1. Too much flour in dough
2. Overbaking
3. Overfermentation

Coarse grain:

1. Too high temperature
2. Fermented too long
3. Too long rising in pans
4. Oven too cool at first
5. Pan too large for size of loaf

6. Sour taste:

Period of fermentation too long or temperature too high while fermenting causes formation of acetic acid
 Poor yeast and flour
 Stale yeast starter
 Incomplete baking

FOOD VALUE OF BREAD

"A love of beauty is based altogether on a well-fed interior."—Chinese Proverb.

Bread has held its prominent place in our diet not because it is so simple to make or because it is so inexpensive, but primarily because of its vital worth as a nourishing food. If you review in your own mind the food principles found in bread, especially in whole wheat bread, you will find that you have an almost perfect food. It is no wonder, then, that Dr. Charles Sheldon, a great lecturer and author, said when asked for his favorite recipe, "A recipe of my favorite dish is very simple—bread and milk with American Cheese broken into it. After a luncheon of this I can work all afternoon—better than if I had had the regulation dinner."

The food principle most lacking in our bread is fat and so when butter is added this deficiency is corrected.

A common criticism made by doctors and dietitians is that we Americans eat too many highly refined food products, such as highly milled breadstuffs. We should eat more of the whole cereals and grain products, more of the fibrous vegetables and fruits. Our health demands that we adjust our food habits to conform with the best that science has taught us. The use of whole cereal breads is one way of treating yourself to a delicious food that is also healthful.

MATERIALS AND METHOD OF MAKING WHOLE WHEAT BREAD (2-pound loaves)

Materials Necessary:

- 1 cake compressed yeast
- 2 tablespoons sugar
- 1 cup lukewarm water (80°) or milk
- 1 tablespoon salt
- 2½ cups milk (scalded and cooled)
- 4½ to 5 cups whole wheat flour
- 2¼ cups white flour
- 2 tablespoons fat
- All measurements level
- All flour sifted before measuring
- Dairy thermometer used for temperatures

Method for Hard Wheat Flour

Dissolve the yeast cake and sugar, add the water; add the milk which has been scalded and cooled to correct temperature (see p. 14). Put in 3 to 4 cups of whole wheat flour. Beat until bubbles rise, add the salt and fat, then add the white flour and enough whole wheat to make a soft dough or until the dough fairly cleans the bread bowl. Turn onto the dough board and let rest 8 minutes so the gluten may tighten up and the bread will be tender and easier to handle. Less flour will also need to be added so that the bread will not be too stiff. Knead quickly and lightly, folding dough toward you and turning one-fourth way round with each kneading. Grease a bowl and turn the dough around it in several times until it is coated with fat. This prevents a crust from forming. Cover the dough, keep in uniformly warm place (80-82°) and let rise until it has doubled its bulk. Punch the dough in its center, fold four sides to the center and punch. Turn it over, cover and

let it rise again about 45 minutes. If a third rising is allowed, follow the preceding directions for punching and let it rise for 15 minutes.

The bread is then ready for molding into loaves. One good method of molding loaves is the way the bakers do it:

Flatten the dough out into an oblong shape, using the palms of the hands. Fold it and seal the long sides together by pressing down with the heels of the palms. Then elongate the loaf slightly. Fold it again, lapping the ends in the middle. Seal. Fold the long side to the center. Seal. Fold again, bringing the ends together. Roll to finish the sealing in of the air.

Place the loaves in pans, brush top with fat, let rise and bake according to previous directions.

Overnight sponge for the recipe given above:

Dissolve $\frac{1}{2}$ cake of dry yeast in 1 cup potato water (80°) for 20 minutes. Add 1 cup of sifted whole wheat flour and 1 tablespoon of sugar. Mix well and set away to rise for about 10 hours, keeping it at a temperature of 80° or 82° . Add the remainder of the ingredients following the method given in the above recipe and make a soft dough (p. 20). This recipe and method may be used for *white bread*.

Use a fireless cooker or a sponge box made by same directions for keeping sponge at correct temperature.

SWEDISH TEA RING

(Made by the Champion 4-H Club Team—1929)

- 1 cake compressed yeast
- 3 tablespoons sugar
- $1\frac{1}{3}$ cups milk
- 1 teaspoon salt
- $1\frac{1}{2}$ to 2 cups whole wheat flour
- 1 cup white flour
- 3 tablespoons fat

Method

Dissolve the yeast and sugar. Add the milk which has been scalded and cooled to correct temperature. Add 1 cup of whole wheat flour, 1 cup of white flour, and beat until bubbles rise. Add salt, fat, enough whole wheat flour to make soft dough. Follow the directions for making whole wheat loaf bread on the preceding page until ready for the process of shaping.

Roll the dough on an unfloured board with a rolling pin until it is as thin as possible. Spread with melted butter, sprinkle with brown sugar, chopped nuts or cinnamon. Roll like a jelly roll, cut a piece from each end and join the ends to form a ring. Place on a buttered sheet, cut vertically with scissors into $\frac{1}{2}$ -inch slices, cutting just to lower layer of roll. Tip each slice on to the next slice using fingers of left hand on inner line of tea ring to keep it from spreading to the outside. Let the ring rise $\frac{1}{2}$ hour and bake in moderate oven.

CONCLUSION

Hendrik Willem Van Loon in a highly amusing essay on "Bread" in an issue of The American Mercury magazine regrets that bread making has apparently disappeared from the American home. And that "meanwhile the art of bread making is rapidly falling into desuetude. Soon the last of the bakers will be moved into the Smithsonian Institution, there to be shown among the stuffed effigies of Mohawk Indians

and other extinct races of men. All of which is a pity, for bread was, and in certain parts of the world continues to be, a most noble and honest part of the daily diet. Furthermore, as one of the oldest companions of 'Homo assassinans,' it should be treated with great respect and humble gratitude and not discarded as if it were merely an outworn type of machine gun."

While we smile at Mr. Van Loon's humorous exaggeration of the status of the bread making art, still we know there is more than a grain of truth contained in it. Is it not for every 4-H club girl to answer the challenge contained in Elizabeth Lincoln Otis' version of Kipling's "If?"

"If you can make good bread as well as fudges
Can sew with skill and have an eye for dust,
If you can be a friend and have no grudges
A girl whom all will love because they must."

A working knowledge of how to make bread, better standards for breads, an understanding of the value of bread as a food and greater still, a true appreciation of bread making as a master art—these will be the aims of the Iowa 4-H Bread Club Girl.

